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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,748	10/17/2003	Don Carl Powell	M122-2157	3329

21567 7590 03/22/2006

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EXAMINER

EVERHART, CARIDAD

ART UNIT PAPER NUMBER

2891

DATE MAILED: 03/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/688,748	Applicant(s) POWELL, DON CARL	
	Examiner Caridad M. Everhart	Art Unit 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 December 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-30 and 50 is/are allowed.
- 6) ☒ Claim(s) 31-49, 51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### Response to Arguments

Applicant's arguments with respect to claims 1-30 and 50 have been persuasive . With respect to claims 31-49 and 51, however, applicant's arguments have been respectfully found to be not persuasive for the following reasons. Applicant has argued that the prior art does not teach a pressure greater than room pressure, and that the examiner's reasoning that the pressure is a variable of the art is not correct. However, on page 13 of applicant's specification, at about lines 5-10, applicant states that the pressure can be below, at, or above room ambient pressure. Therefore, it would seem that the pressure is not critical for this step, and only result-effective ranges can be optimized so as to affect the patentability to nonpatentability(MPEP 2144.05). In addition, although ambient pressure and above ambient pressure do not overlap, the pressure is obvious because ambient pressure and above ambient pressure are close enough that it would have been obvious to one of ordinary skill in the art at the time of the invention to have used a pressure above ambient(MPEP 2144.05). With respect to the act of flowing nitrogen, the combination of references is relied upon in the rejection, with Miner providing the act of flowing in that N2 gas is fed into the chamber(col. 7, lines 59-67 and col. 10, lines 64-67 and col. 11, lines 1-5).

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 31, 34, and 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo, et al. (US 6,534,401B2) in view of Storbeck, et al. (US 2004/0121569A1) and further in view of Miner et al (US 6,114,258)(cited in the previous Office Action).

Joo, et al discloses a process in the formation of a transistor(col. 7, lines 60-63) which includes the steps of placing a substrate in a reaction chamber(col. 2, lines 19-20); exposing the substrate to a gas mixture of hydrogen and oxygen(col. 2, lines 32-35) such that the ambient to which the substrate is exposed is a water/hydrogen mixture(col. 2, lines 35-40); the mixture is such and the conditions are such that the silicon portion of the electrode stack is oxidized while the tungsten upper portion of the electrode is not oxidized(col. 2, lines 38-44); once the process of growing oxide on the silicon layer has reached the desired thickness, the reaction is stopped by stopping the flow of oxidation process gases to the chamber and decreasing the temperature of the chamber(col. 7, lines 45-52 and col. 8, lines 17-23). RTP apparatus may be used(col. 2, lines 64-67). Joo, et al teaches that the reaction can be at atmospheric pressure(col. 7, lines 27-20) and that desired reduced pressures can also be achieved(col. 2, lines 63-67 and col. 3, lines 37-40).

Joo, et al does not specifically state that there is nitrogen in the mix, nor that there is nitrogen in the chamber during cooldown, nor the use of nitrogen to reduce the partial pressure of the reactants.

With respect to nitrogen in the mix, it would have been obvious to one of ordinary skill in the art at the time of the invention to have included nitrogen in the mix in the process taught by Joo, et al because Joo, et al that inert gas is switched to a gas mix that comprises H<sub>2</sub> and H<sub>2</sub>O(col. 1, lines 37-41 and col. 2,lines 29-35), so that it is implied that while the switching is taking place there would still be some flow of nitrogen, and that even after the switching is complete there could still be nitrogen in the mix, since the word "comprising" is used.

Storbeck, et al discloses that during the reduction of the temperature of the wafer nitrogen gas is flowed through the reaction chamber(paragraph 0043).

Miner et al discloses that nitrogen can be used to reduce the partial pressure of the reactants(col. 10, lines 55-67 and col. 11, lines 1-10).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the process taught by Joo, et al with the teaching of Storbeck, et al concerning the nitrogen in the chamber during cooldown because Joo, et al discloses that the oxidation process gases(which would include the hydrogen, since the oxidation process gas includes hydrogen) are stopped(col. 8, lines 16-20), and since it is clear from the above discussion that the nitrogen was part of the mix, the nitrogen would continue to flow.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have simultaneously introduced nitrogen as the temperature was reduced to purge the reaction gases as taught by Miner et al in the process taught by Joo et al in order to maintain the temperature of the substrate, as Miner et al teach that the temperature determines when the reaction is stopped.

Claims 32,33,35-46, and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo, et al as relied upon above in view of Miner, et al. (US 6,114,258)

Joo, et al does not specifically state that nitrogen is or is not in the oxidation mix nor does Joo, et al disclose CO<sub>2</sub> or CO or the nitrogen flow during cool-down and the recited pressure ranges, although Joo, et al teaches atmospheric pressure and reduced pressures as cited above.

Miner, et al disclose oxidation of silicon using an oxygen-containing gas and a hydrogen-containing gas(col. 2, lines 20-27 and 34-40). The oxygen-containing gas can be water in the form of steam(col. 5, lines 7-10), and the hydrogen-containing gas can be hydrogen(col. 5, lines 12-13). Miner, et al further disclose that in the temperature ramp-down or cooling step, simultaneously to the cooling, nitrogen gas is fed to the reaction chamber(col. 10, lines 64-67 and col. 11, lines 1-6). Miner, et al further discloses that hydrocarbons such as methane may be included as other hydrogen-containing gases in the mix(col. 8, lines 20-25). This would result in the mixture exposing the substrate to carbon dioxide and carbon monoxide, as the decomposition in the mixture at the elevated temperatures would result in CO<sub>2</sub> and CO. Miner also teaches that the oxidation gas can be void of inert(col. 7, lines 54-58) by teaching that

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the flow of inert is stopped. Miner also teaches that in the step of stopping the reaction, reaction gases can be stopped before the nitrogen is introduced(col. 11, lines 8-11).

Miner also teaches the method as part of a process of forming transistors(col. 1, lines 55-64).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the teachings of Miner, et al with the process taught by Joo, et al first with respect to the nitrogen in the cool-down step for the same reasons as given above in the case of the combination with Storbeck, et al. and this would also include the including of nitrogen in the oxidation mix, or not including the nitrogen in the oxidation mix as taught by Miner, et al. could also be included. This would be within the ordinary skill in the art, as the proportion of nitrogen in the mix is a variable of the art, which could be reduced to being removed, as taught by Miner, et al. With respect to the CO<sub>2</sub> and the CO, it would have been obvious to one of ordinary skill in the art to have used the addition of hydrocarbons such as methane with the process taught by Joo, et al because Miner, et al teach the equivalence in oxidation of hydrogen and hydrocarbons as the hydrogen source.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the recited pressure ranges because the pressure is a variable of the art which one of ordinary skill in the art would have been able to determine.

Similarly, with respect to reducing the flows of the oxidizer and other gases to zero, these variations are also within the ordinary skill in the art to control the order of turning

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off the process gases. In the absence of a showing of criticality of the order of turning off of the process gases, this would therefore have been an obvious variation.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*C. Everhart*  
CAROL EVERHART  
PRIMARY EXAMINER

C. Everhart  
3-18-2006